

INTERNATIONAL CENTER FOR THE INVESTIGATION OF THE EL NIÑO PHENOMENON CIIFEN

1. To offer the operational structure of the RCC-WSA as a mean to enhance drought monitoring and early warning capacities.
2. To contribute in the integration and “translation” of the different drought monitoring information sources at global and regional level produced by several institutions, UN agencies and countries in order to facilitate the understanding of wider communities of beneficiaries, the use and effective application of such information and the necessary elements to ensemble an adequate climate user interface for water managers.

EARTH OBSERVATION GROUP (VITO)

Delivery of EO datasets: VITO is responsible for the storage, processing and distribution of several global datasets of time series of satellite based indicators in the framework of the projects MARSOP and Copernicus Global Land service. We are also experienced in the data fusion of high and medium resolution satellite imagery. We could enhance access to a wide range of products from different satellites (Proba-V, METOP-AVHRR, Sentinel 2/3), climate data and support in managing and pre-processing imagery. Such datastreams could be ingested in existing data integration systems already up- and running by UNESCO or other partners.

UNIVERSITÉ CATHOLIQUE DE LOUVAIN (UCL)

The environmetrics and geomatics team (P. Defourny / C. Lamarche /F. Jonard /...) develop expertise in environmental geomatics at the regional and global scale. At the regional scale, the CENNIC project aimed to develop methodological schemes to update the hydrological network of the Walloon region by consistent cartographic integration of existing databases. In the ORTHOWATCH project, the team was in charge of the annual mapping of water surfaces at submetric resolution (25 cm) using aerial imagery. Results will shortly be used in the context of the distribution of subsidies from the European Common Agricultural Policy. On a global scale, the team has experience in time series analysis and processing of large amount of data. In the EU FP7 Geoland2 project, the team focused on the monitoring of the surface water dynamics over Africa using medium resolution daily imagery and the detection of anomalies in nearly real time. Finally, in the framework of the European Space Agency Climate Change Initiative (ESA CCI), the team was involved in the mapping of permanent surface water bodies using existing water bodies’ datasets. This product was selected to be used across all essential climate variables tackled by the ESA CCI.

INSTITUTE FOR TECHNOLOGY AND RESOURCES MANAGEMENT IN THE TROPICS AND SUBTROPICS (ITT)

By assessing drought vulnerability and resources sustainability in river basins located in LAC countries. The analyses will be carried out in the scope of guided MSc and PhD theses as well as of research and interdisciplinary student projects. The drought vulnerability of basin populations (urban/rural) and different economic sectors is assessed based on historical drought periods and scenarios addressing socioeconomic development in the specific basin. Key activity is to systematically guide the studies and document the results (e.g. on www.basin.info.net).

WORLD BANK

1. Implementation of pilot studies to reduce drought vulnerability:

In the “ClimWaR-LAC” proposal, it is mentioned that the implementation strategy includes some pilot case studies for the application of the 3 pillars on drought preparedness. Indeed, it is declared that the UN agencies plan to execute them “in collaboration with on-going efforts of the WPP and with specific World Bank operational task teams”, so the reciprocal connection is explicit in the proposal.

In fact, the WB Water Partnership Program intends to finance and promote in the very near future from one up to three country pilot innovative activities/approaches to reduce vulnerability to drought. These planned pilots will be understood as complementation to particular World Bank projects in order to get to a better understanding of what is the status of drought preparedness in the project area and to improve it by incorporating new knowledge or facilitating the absorption of existing knowledge on drought resilience.

Drought-prone areas will be the targets for the financed studies, prioritizing arid and semi-arid zones and/or areas with low-income settlements. This also connects with the second proposal on “Addressing water security: climate impacts and adaptation responses in Africa, Asia and LAC”, where one of the focus is on assessing and reducing vulnerability through indicators particularly in pilot remote drylands and mountains areas immersed in poverty.

This second proposal is very comprehensive in the technical measures that could be used in the pilots (capacity building activities, soil and landscape conservation, rainwater harvesting, etc.), always adapted to the particular needs identified, and the same flexibility and context-specific methodology and is openly recommended for the WB pilot case studies.

Moreover, a step expected for “ClimWaR-LAC” is to trigger policies for drought preparedness in its pilot studies, which is also pursued in the WB activities on drought. To sum up, mutual collaboration and exchange of experiences UNESCO-WB in the country pilots is advisable.

2. Focus on monitoring tools:

ClimWaR-LAC plans the improvement of the currently available data products on drought, fundamentally monitoring and information storing & management tools, etc. and specifically those oriented towards water management in the pilot watersheds.

The WB has also identified a need for consolidating hydro-meteorological networks by means of its activities in order to provide consistent climate information to feed the drought indices and the monitoring/early warning systems to be put in place.

INTERNATIONAL RESEARCH INSTITUTE FOR CLIMATE AND SOCIETY (IRI)

The IRI has worked / is currently working on projects to improve the monitoring and/or forecasting of drought in Chile, Uruguay, Peru, and Jamaica. We are happy to coordinate around these efforts to the extent possible and would look forward to improve upon / transfer these methodologies to new locations moving forward.

The IRI recently installed its Data Library at Latin American Observatory for Extreme Events, which led to the development of the Datoteca, which includes seasonal forecast products for the region. This could be expanded to more specific drought products independently or in collaboration with other efforts.

The IRI is currently working to install the Data Library at the Center for Tropical Agriculture (CIAT) in Cali, Colombia, with the goal of consolidating a range of information applicable to agricultural decision makers in Colombia, Guatemala and Honduras.

**WATER CENTER FOR ARID AND SEMI-ARID ZONES IN LATIN AMERICA AND THE CARIBBEAN
(CAZALAC)**

1. Congress on Water Management in Arid Zones: this activity is intended to promote the dialogue between the scientific community, the user community and policy makers, related to water management. The result of this activity will be a book that summarizes every methodology that is used nowadays to manage water in LAC.
2. In the same line, on (date) the 2nd International Expert Symposium “Coping with Droughts” will be held. The topics to be considered are drought monitoring and early warning capacities linked to vulnerability assessment and drought preparedness policies.

INSTITUTE FOR TECHNOLOGY AND RESOURCES MANAGEMENT IN THE TROPICS AND SUBTROPICS (ITT)

1. Develop seasonal and long term water availability projections for selected river basins/watersheds and train local water managers on uncertainties and application Identify and suggest ecosystem based drought adaptation measures (proposals in calls ERANET-LAC, IKI) for the Andean region (and tropical catchments, projects ADAPTA, TropiSeca).
2. Implementation of climate services to improve water management: provide basin scale information to connect to LAC drought monitor (basin scale water balancing, project proposal GROW/BMBF)

INTERNATIONAL CENTER FOR INTEGRATED WATER RESOURCES MANAGEMENT (ICIWaRM)

Implementation of climate services to improve water management.

Collaboration: Inclusion of the available climate services in the CRIDA guidance manual and web interface would offer the tools to a wider audience.

INTERNATIONAL CENTER FOR THE INVESTIGATION OF THE EL NIÑO PHENOMENON (CIIFEN)

1. To contribute in the implementation of climate services for water resources management at national level through the NMHS, local agencies and other private/public stakeholders.
2. To implement as part of our operational exchange with the NMHS from WSA the seasonal forecast including more complex analysis with SPI and eventually SPEI plus other remote sensing products which are in construction.
3. To offer the current CIIFEN's distribution list in Latin America with emphasis in Western South America region for dissemination of products and services related with water management.

EARTH OBSERVATION GROUP (VITO)

Support in developing and implementing user oriented tailored climate services. Our experts could work together with UNESCO and local staff to design and implement climate services pilots such as:

- Incorporation of climate indicators and services into food security monitoring systems
- Strengthening regional and national level food security early warning systems, to include climate and seasonal monitoring
- Provision of tailor made climate analysis and/or bulletins to smallholders

SUB DEPARTMENT OF INFORMATION, MONITORING AND PREVENTION FOR INTEGRATED RISK MANAGEMENT (IMP-GIR) OF THE MINISTRY OF AGRICULTURE OF CHILE

1. Integrated Risk Management (IMP-GIR) To develop a Mobile Application for users of local level with Access to real time meteorological information, alerts, forecasts and recommendations of actions. This App incorporate the available information developed by the different platforms of the Sub Department IMP-GIR.
2. To develop models that link the agroclimatic information available and forecasts of yields or others indicators of agricultural production.
3. To strengthen backup and security systems for agroclimatic information, for existing platforms and mobile App. High capacity server for data saving, response speed and information guaranties.

THE INTERNATIONAL CENTER FOR HYDROINFORMATICS (CIH)

Developing Technology Information for climate services and water resources management:

1. Data Center structure to attend some of the project demands;
2. Database maintenance raised throughout the project;
3. Specific Applications (Softwares) to access, process and report data raised throughout the project, specifically hydrologic and climatic data;
4. Technological support to host the Latin American and Caribbean Drought and Flood Monitor, facilitating the construction and maintenance of a regional database;
5. Implement a case study applied in the HELP-Basin São Francisco Verdadeiro, facing ecosystem services strategies;
6. Technological support for application of mathematical models;
7. Georeferenced diagnostics of the study areas creating a standardized base.

INTERNATIONAL RESEARCH INSTITUTE FOR CLIMATE AND SOCIETY (IRI)

The IRI is eager to pursue work to evaluate, quantify and otherwise describe the socioeconomic benefits of climate information for societal decision making.

Recent efforts have included contributions to a WB-WMO-USAID book Valuing Weather & Climate: Economic Assessment of Meteorological & Hydrological Services. Colleagues from the University of Arizona also recently conducted an evaluation of the impact of drought forecast information co-developed by the IRI on agriculture in Jamaica. The IRI is in the process of developing a proposal to advance socioeconomic benefits analysis around a WFP project called FoodSecure.

We propose that the ClIMWaR-LAC might engage in this sort of analysis in order to further understand and explicate the role that climate information plays in improving our ability to manage and adapt.

EARTH OBSERVATION GROUP (VITO)

Analysis of long term time series of EO data for climate services:

We could contribute the projects by providing relevant information on climate services to support adaptation, mitigation and disaster risk management. Possible examples of such information could be: drought vulnerability maps, analyzing phenological parameters and trend analysis of climate and vegetation indices data.

Session 3: Climate Change Impact on Water Resources Management

INTERNATIONAL CENTER FOR INTEGRATED WATER RESOURCES MANAGEMENT (ICIWaRM)

1. Improve integrated drought risk management towards a policy for drought preparedness.
Integration: Application of the CRIDA method within the LAC region for long-term water resources planning would “Contribute to the development of drought preparedness policies and mitigation”.
Collaboration: Inclusion of the Developed Methodologies for Impact Assessments within the CRIDA method would strengthen applications in the LAC region.
2. Strengthening of the community of practice on dryland management (GWADI-LAC) to support development and implementation of climate risk management in the region
Integration: Integrating the CRIDA community of practice with the GWADI-LAC community of practice would strengthen both efforts. The AGWA team plans to create a web interface for the CRIDA community to ensure that scientific updates, best practices, and applied case studies are continuously incorporated into the CRIDA method.

INTERNATIONAL WATER SECURITY NETWORK (IWSN)

CliMWaR-LAC outlines a series of measures to project and prepare for future climate extremes, especially drought, through enhancing resilience and undertaking mitigation and response measures. IWSN supports ongoing initiatives of this kind with partners in Chile and Peru. Linked hydrologic and climate analyses of river-basin water scarcity, the implications for irrigated agriculture, urban supply, and ecosystem services, as well as social vulnerability and institutional capacity assessments in the Maipo and Elqui basins in Chile, and the Ica and Piura basins in Peru, will enhance scientific and managerial capacity. IWSN proposes to marshal and leverage resources (scientific studies and science-policy engagement efforts) that provide case-study basins for CliMWaR-LAC, and to further integrate stakeholders and research partners Pontificia Universidad Católica de Chile and Universidad Nacional Mayor de San Marcos and Universidad Agraria Nacional of Peru. The proposed 36-month CliMWaR-LAC project meshes well with IWSN and IAI-supported activities that we propose to leverage. Additionally, UNESCO/Flemish financial support to Chilean and Peruvian partner organizations would allow IWSN to provide value-addition through improving stakeholder consultation and enhancing science-policy coproduction of these proposed investments.

Session 4: Capacity building gaps and needs

INTERNATIONAL CENTER FOR INTEGRATED WATER RESOURCES MANAGEMENT (ICIWaRM)

Training of multiple stakeholders to strengthen capacities on climate services targeting water resources management and to increase resilience to climate hazards.

Integration: While many of the listed actions target more real-time water management capacity building, the AGWA team could support capacity building for long-term planning which would be strengthened by the climate services provided through these stakeholder workshops.

INSTITUTE FOR TECHNOLOGY AND RESOURCES MANAGEMENT IN THE TROPICS AND SUBTROPICS (ITT)

Training of basin scale working stakeholders and academics in drought management (Community of Practice) related to climate and water resources monitoring, tracers, modeling, information management to contribute to the suggested trainings:

- a. Integration of hydrological data in near real-time from remote sensing and in situ monitors to enable a more integrated approach to continuously calibrate models for water management
- b. Training on vulnerability assessment of societies and local livelihoods
- c. Development of real-time drought indicators (SPI/SPEI) for climate extreme monitoring
- d. Hydrological forecasting for improved water resources management in snow and ice dependent catchments

SUB DEPARTMENT OF INFORMATION, MONITORING AND PREVENTION FOR INTEGRATED RISK MANAGEMENT (IMP-GIR) OF THE MINISTRY OF AGRICULTURE OF CHILE

1. Support the further development of national drought monitoring and early warning capacities: International Symposium on Drought Management Tools 2016, or, an International Seminar to share experiences between countries related with Agroclimatic Observatory for establishment of joint work areas. Topics to be considered: available information, collaborative work, institutional framework (Technical Committee); integration of the Scientific community, information according to every kind of users (farms, advisors, authorities, etc.); integrating of monitoring and preparedness for disasters; etc.
2. Contribute to the development of drought preparedness policies and mitigation: International Symposium on Drought Management Tools 2016; or, an International Seminar to share experiences between countries related with Agroclimatic Observatory for establishment of joint work areas. Topics to be considered: available information, collaborative work, institutional framework (Technical Committee); integration of the Scientific community, information according to every kind of users (farms, advisors, authorities, etc.); integrating of monitoring and preparedness for disasters; etc.

INTERNATIONAL RESEARCH INSTITUTE FOR CLIMATE AND SOCIETY (IRI)

After a several year project on climate and water conducted jointly with both the University of the West Indies and the Caribbean Institute for Meteorology and Hydrology, the IRI is eager to pursue work to train water managers in the region in hydrological modeling, as a practical way to introduce climate information into actual planning and decision making. This would run the gamut from very simple Excel-based models to more complex models (e.g., SWAT, WEAP, etc.).

Session 5: Development and Implementation of Adaptation Strategies and Climate Risk Management

INTERNATIONAL CENTER FOR THE INVESTIGATION OF THE EL NIÑO PHENOMENON (CIIFEN)

To share the experiences of CIIFEN in the assessment of climate vulnerability in different geographic environments and spatial scales, considering social, economic and environmental dimensions.

INSTITUTE FOR TECHNOLOGY AND RESOURCES MANAGEMENT IN THE TROPICS AND SUBTROPICS (ITT)

1. Similarly as to the CLiMWar-LAC programme, ITT will contribute by assessing drought vulnerability and resources sustainability in Andean river basins. The analyses will be carried out in the scope of guided MSc and PhD theses as well as of research and interdisciplinary student projects. The drought vulnerability of basin populations (urban/rural) and different economic sectors is assessed based on historical drought periods and scenarios addressing socioeconomic development in the specific basin.
Key activity is to systematically guide the studies, provide info maps for stakeholders and document the results to be used by the public and in further studies (e.g. on www.basin.info.net).
2. Identify and suggest site appropriate ecosystem based adaptation measures responding to hydro-meteorological risks (proposals in calls ERANET-LAC and IKI) for vulnerable Andean catchments.
3. Also further research related to hydro-meteorological processes in Andean catchments will be carried out for improved climate change impact studies, water availability scenario development and seasonal predictions.

INTERNATIONAL CENTER FOR INTEGRATED WATER RESOURCES MANAGEMENT (ICIWaRM)

Building climate resilient watersheds while enhancing their ecosystem services:

Collaboration: State of the art methods to evaluate ecosystem services would strengthen the environmental aspect of the CRIDA vulnerability assessment.

UNIVERSITÉ CATHOLIQUE DE LOUVAIN (UCL)

Recent advances in satellite Earth Observation (EO) – with the development of consistent global historical records of crucial environmental and climatic variables – provide new means to start unravelling the processes driving long-term changes in climate extremes, and understanding the impact of these changes on terrestrial ecosystems. In addition, these datasets offer an observational benchmark to evaluate the skill of climate models at representing climatic extremes and vegetation dynamics. With the goal of revealing how droughts, heatwaves and extreme rain events have changed in frequency and intensity over the past three decades, SAT-EX aims at detecting the causes behind these changes and assessing the consequences for terrestrial vegetation. The ability of our current IPCC climate models to estimate these processes will be evaluated by comparison to novel satellite-based data records. The methods used within the framework of SAT-EX and applied to the EO records include spatiotemporal modelling, fingerprint analyses, and machine learning techniques. The datasets produced will be made freely available for all potential users.

Session 5: Development and Implementation of Adaptation Strategies and Climate Risk Management

SUB DEPARTMENT OF INFORMATION, MONITORING AND PREVENTION FOR INTEGRATED RISK MANAGEMENT (IMP-GIR) OF THE MINISTRY OF AGRICULTURE OF CHILE

Develop effective methodologies to assess drought vulnerabilities at the watershed level:

To support a participative process to elaborate and validate a methodology for the assessment of socioeconomic impacts and vulnerability of drought. In order to construct and implement this methodology it will be integrated the public and private sector, and academics in the process. In addition, it will be formed a working group to coordinate, from the central level, the application of a work plan.

WATER CENTER FOR ARID AND SEMI-ARID ZONES IN LATIN AMERICA AND THE CARIBBEAN (CAZALAC)

1. To contribute in the implementation of a methodological framework for drought vulnerability assessment in Chile, with the Ministry of Agriculture of Chile and the PRONACOSE (México).
2. During 2014 to 2015 two workshops conducted on climate change scenarios in vulnerable watershed to climate variability in LAC were developed. Within the workshops framework, a study case is proposed using the Huasco Basin (Chile) as pilot area in order to conclude what has been done previously. This activity could be part of the AGWA initiative.

Session 6: Development and Implementation of Adaptation Strategies and Climate Risk Management

KULEUVEN: DIVISION OF SOIL AND WATER MANAGEMENT - GUIDO WYSEURE

1. ECUADOR: Starting in 2002 involved in the studies of the hydrology of the paramo ecosystem at altitudes above 3500m but at lower catchments. Attention is also given to the impact of the water use by irrigation on the water balance of hydrological catchments. The effect of irrigation methods and application efficiency is compared to the optimum irrigation requirements as a benchmark. This allows to investigate the possible water use efficiencies gains on a catchment scale by introducing better irrigation methods and water management and mitigating the impact of climate change.
2. BOLIVIA: Team project with Universidad Mayor San Simon de Cochabamba on irrigation management to start in May 2016. The project will study the irrigation development, which often focuses on water supply by improving open canal infrastructure disregarding the evolution towards pressurized irrigation as developed by farmers. Demographic and agricultural growth, exacerbated by climate change and land degradation have increased the water competition leading to conflicts. This project aims to increase research and professional capacities confronting this challenge and innovating the irrigation development policy paradigm shifting from a water-supply to a water-demand management approach.

WATER MANAGEMENT & TECHNOLOGY TEAM (VITO)

On a regional scale our department can offer conceptual and numerical rainfall-runoff modelling of (sub)catchments. Based on catchment characteristics and meteorological data we can set up rainfall-runoff models for specific catchments. We propose the use of open source models that simulate relevant hydrological processes (e.g. snow melt, evapotranspiration, etc.) with sufficient physical detail. After calibration and validation, the models can be used for the impact analysis of climate change scenarios and for the selection of appropriate adaptive actions.

EARTH OBSERVATION GROUP (VITO)

Support in developing and implementing user oriented tailored climate services
Our experts could work together with UNESCO and local staff to design and implement climate services pilots such as:

- Incorporation of climate indicators and services into food security monitoring systems
- Strengthening regional and national level food security early warning systems, to include climate and seasonal monitoring
- Provision of tailor made climate analysis and/or bulletins to smallholders

INTERNATIONAL CENTER FOR THE INVESTIGATION OF THE EL NIÑO PHENOMENON (CIIFEN)

To share the experiences on enhancing local governance to support climate risk management and long term adaptation processes.

INSTITUTE FOR TECHNOLOGY AND RESOURCES MANAGEMENT IN THE TROPICS AND SUBTROPICS (ITT)

By developing basin specific drought indicators (hydrological, climate, vegetation, soil moisture, agricultural/demand driven) and corresponding thresholds. Suitable indices will be suggested to be applied in drought management of pilot basins.

Session 6: Development and Implementation of Adaptation Strategies and Climate Risk Management

THE INTERNATIONAL CENTER FOR HYDROINFORMATICS (CIH)

Communication strategy to inform affected areas by floods, droughts and extreme weather variations.

WATER CENTER FOR ARID AND SEMI-ARID ZONES IN LATIN AMERICA AND THE CARIBBEAN (CAZALAC)

1. To develop the Mid-Summer Drought Atlas of Cuba and later on in other regions of LAC. This product will be based on the Drought Atlas for Latin America and the Caribbean methodology and includes new modeling techniques.
2. To coordinate a “Climate Data Library” workshop (Fostering the Climate Data Library) to train experts from several meteorological services so they can implement it in their countries. This activity also supports the G-WADI initiative, which seeks, among other objectives, sharing knowledge of hydrological systems.

UNIVERSIDAD MAYOR DE SAN ANDRES – MAGALI GARCÍA

Many farmers’ ancient strategies to cope with Andean naturally highly variable climate are based on situations which are no longer available due to either physical or social reasons. In fact, many farmers have already changed their production systems to rapidly respond to the effects that temperature rising and erratic rainfall are producing. Young and/or innovative farmers are requesting agencies for more efficient tools that would help them to actually adapt efficiently and positively to the impacts of climate change in the Andes where the altitude and the previous limitations could make farmers, take advantage of the impacts of the changes in temperature and rainfall.

Although several initiatives are being developed to support farmer’s adaptation to climate change, the scientific bases for these actions are weak. Firstly, little has been evaluated within glacier dependant ecosystems from the scientific and technical point of view. Secondly the abrupt and largely heterogeneous local physiography makes extremely difficult the efforts on adequate forecasting if the local dynamics are unknown. Thirdly, the links between the factors influencing those productive ecosystems have not been settled, having isolated results for an extremely integrated and interdependent problem. Finally, there is a large tendency to underestimate the knowledge of Andean farmers of actions that they might take to efficiently react.

As such, the present proposal intends to develop a work based on a specific pilot high altitude watershed within the Bolivian Andes to address the following evaluation questions:

- What is the perception of Andean communities’ (is there a gender differentiation?) on climate and water availability change and how do these perceptions compare to changes noticed and predicted in scientific literature?
- Which meso, macro and microscale meteorological mechanisms have and the highest influence on the local micro-watersheds common in the Bolivian Andes?
- Which populations between and within families are most vulnerable to water reduction imposed by glaciers retreat? Why? What adaptation measures could reduce the vulnerability of those groups?
- How the recognition of local knowledge could be addressed to improve and optimize the early warning systems?
- What specific urgent and medium term actions, both technological and locally adapted are required to support farmers’ resilience to undependable water availability and what type of external factors might affect the success of those?

Session 7: Adaptive water and soil conservation measures

INTERNATIONAL WATER SECURITY NETWORK (IWSN)

Addressing Water Security, with a broader global coverage, has similar, very tangible links with work in South Asia, directly supported by or leveraged by IWSN. Specifically, we have an ICIMOD-supported Univ. Arizona PhD student soon to be working on farmer-managed irrigation in the Gandaki Basin of Nepal and India. Additionally, our CGIAR-supported “Irrigation-Hydropower Nexus” HI-NEX project in the Indian Himalayas is explicitly geared toward security of the water-energy-food nexus. We propose that UNESCO/ Flanders, via Addressing Water Security, provide additional financial support to partners ICIMOD, People’s Science Institute, and University of Delhi’s Shaheed Bhagat Singh College to field local study teams and provide access to decision-makers, with IWSN playing a role to enhance stakeholder engagement and science-policy dialogues in support of water security.

KULEUVEN: DIVISION OF SOIL AND WATER MANAGEMENT - GUIDO WYSEURE

1. ECUADOR: Coordinator since 2007 till now the Interuniversity cooperation (IUC) between the Flemish universities and the Universidad de Cuenca, Ecuador. One of the projects is on water quality management. Advisor to the VLIR Ecuador network to organize the interuniversity MSc in Water Resources Management. Jointly organized by ESPOL (Guayaquil), EPN (Quito), UCuenca and UTN (Ibarra) in cooperation with Flemish MSc programmes like Water Resources Engineering.
2. ECUADOR: Coordinating the integrated project (arid climate case) on water management of the Rio Jubones, which is South of Cuenca and discharging in the pacific in Machala for the MSc students of Water Resources Engineering of IUPWARE (VUB-KU Leuven). The middle of this catchment has only 200 mm of yearly rainfall.
3. PERU: Project leader in the first phase of the iUC with UNALM on the development of Institutos regionales de desaloro (IRD's). 2009-2015. Teammember for water management in the IUC (2009 till now). Water management research in the Mantaro valley and the Cañete irrigation scheme.
4. PERU: Promotor of a VLIR- teamproject with the Universidad Nacional de Cajamarca since 2012 till now on the impact on the water resources of the mining industry. The project studies the impact of the mining on the quantity and quality of the water resources in the region of Cajamarca. The opencast copper/gold/silver mines are situated in the headwaters of several rivers and in the Jalca ecosystem. This TEAM-project tries to reinforce the Universidad Nacional de Cajamarca (UNC) as regional actor so that the environmental impact can be assessed in an objective and neutral way.

WATER MANAGEMENT & TECHNOLOGY TEAM (VITO)

On a local scale we could contribute to data monitoring by in situ sensor networks for measuring groundwater levels, groundwater quality, soil humidity, surface water quality and bathymetry and its visualization by Sensorview software. We can further contribute by designing and performing lab and field pilot studies for more sustainable water use in agriculture by sensor technology, water and soil conservation pilots (such as aquifer recharge, runoff and erosion reduction pilots). We have developed and applied hydrological modelling tools for soil and groundwater in optimization of irrigation, sustainable use of agrochemicals, and contaminated site assessment.

Session 7: Adaptive water and soil conservation measures

UNIVERSITÉ CATHOLIQUE DE LOUVAIN (UCL)

The soil and water engineering team (M. Vanclooster / C. Bielders / M. Javaux / S. Lambot) develop research in the fields of ecohydrology, soil and water conservation, soil hydrology and hydrogeophysics to support soil and water engineering and management in temperate and drought prone subtropical areas (in particular arid and semi arid regions: Northern Africa (Morocco, Algeria, Tunisia) – West Africa (Niger / Burkina Faso / Senegal)). They are strongly involved in research programmes related to soil and irrigation water management in Morocco, soil and water conservation in Algeria and Tunisia, and were involved in EU-FP7 CLIMB project dealing with the evaluation of impacts of climate change on the local hydrology of Mediterranean catchments. In these research programmes, they particularly look for structural resilient pathways to manage scarce water resources and enhance water security through appropriate soil and water conservation, the use of alternative water resources and the optimal use of groundwater. The group recently published the pan-African vulnerability map of groundwater systems, which is essential to understand the role of groundwater systems in large scale water security enhancing programs.

The ELle-UCL of can contribute to Unesco CLIMWAR-LAC and WATER SECURITY by providing various water bodies datasets, technical advice and recommendations related to water and climate.

LABORATORY OF HYDROLOGY AND WATER MANAGEMENT-UGENT

HYDRAS+ is a BELSPO-financed project primarily focused on advancing techniques of assimilating satellite observations into hydrologic models to improve their soil moisture behaviour. Assimilation experiments range from regional scale to continental scale with 1 km to 0.25 degrees spatial resolution respectively and a novel copula-based approach for downscaling the mostly course-scale satellite observations to the model resolution at the regional scale is implemented. Further, since assimilating raw satellite data into hydrologic models requires detailed information on vegetation, the potential of dual-state parameter estimation is explored in order to update both soil moisture and vegetation (e.g. LAI) simultaneously giving both improved soil moisture and vegetation information as an output. Two distinct hydrologic models, namely the Community Land Model and the conceptual SUPERFLEX model, are compared in order to assess whether a simpler conceptual model can yield comparable results as the fully-physical, but computationally very demanding, CLM model. All the methods developed within the project are specifically examined for their usefulness within the context of drought monitoring and their potential to improve existing drought-monitoring systems. Within this scope a number of drought indices will be computed from the in-situ validated model outputs and compared to other state-of-the-art datasets for specific drought events. To meet end-user demands as closely as possible experiments can be changed or set-up specifically to any request

Session 7: Adaptive water and soil conservation measures

WATER CENTER FOR ARID AND SEMI-ARID ZONES IN LATIN AMERICA AND THE CARIBBEAN (CAZALAC)

1. Coordinate a workshop and a further seminar to train experts in matter of Groundwater Recharge techniques. This activity will start the implementation of a program of groundwater recharge in pilot areas with the support of PRONACOSE (México). The final results will be presented on a seminar which its primary objective will be to share successful experiences. (COSECHA DE AGUAS)
2. Seminars: Soil and water in climate change scenarios: CAZALAC will coordinate series seminars in diverse LAC countries regarding soil-water conservation and management in the climate change scenario. Seminars will be on soil-water relationship (physical, chemical and biological) and risk linking; soil conservation techniques for water quality, soil and water modeling.

Session 8: Capacity building, outreach activities and the Global Knowledge Forum

INSTITUTE FOR TECHNOLOGY AND RESOURCES MANAGEMENT IN THE TROPICS AND SUBTROPICS (ITT)

1. ITT can contribute to such a global knowledge forum with capacity building and training measures to the addressed topics as well as e- learning and Mooc/curricular development for different target group levels. Also the translation from scientific research results in stakeholder friendly information products is one of the key objectives/activities of ITT.
2. Strengthening of the community of practice on dryland management (GWADI-LAC) participate in conferences, trainings and contribute to regional handbook of drought management tools

INTERNATIONAL CENTER FOR THE INVESTIGATION OF THE EL NIÑO PHENOMENON (CIIFEN)

1. To contribute on the design and implementation a sustained and coordinated capacity building strategy with the NMHS from the region including other governmental institutions related with the water sector.
2. To contribute in close coordination with NMHS on building up community of users at national level considering the governmental institutions framework and including other stakeholders.
3. To share the experiences and lessons learnt of CIIFEN implementing adaptation actions in semi-dry environments with local communities and increasing their climate resilience.

EARTH OBSERVATION GROUP (VITO)

Capacity building and training on the use of time series for vegetation and rainfall monitoring: The free and easy to use SPIRITS software developed by VITO and already adopted by various users throughout the world has all the capacities on-board for the generation of early warning indicators based on time series of vegetation indices. We could provide the SPIRITS software and set-up capacity building activities, from simple introductions on the use of EO data till advanced workshops for vegetation and drought monitoring.

INTERNATIONAL WATER SECURITY NETWORK (IWSN)

1. Science Diplomacy and Water Security: Proceeding along separate tracks, each concept—science diplomacy on the one hand, and water security on the other—has gained momentum and acceptance. UNESCO IHP is attempting to unite the two in a new initiative that seeks to promote opportunities for international cooperation via the science of water security. At the same time, and independently, the University of Arizona has teamed with the American Association for the Advancement of Science (AAAS) to host a conference in Tucson, Arizona, on November 16-18, 2016. Both of these initiatives are in early stages of development and support from the Flemish Government and UNESCO would be instrumental in designing mutually desirable activities and programs to promote acceptance of the twinning of the two concepts.
2. Training Workshop on Water Security and Demand Management in the Arid Americas. In July 2015 the University of Arizona (represented by the IAI and IWSN teams comprising AQUASEC) and the Mendoza Departamento General de Irrigación (DGI, the water authority for the province of Mendoza, Argentina) signed a Memorandum of Understanding. The agreement, signed at the request of the DGI, provides for mutual exchanges and collaboration on issues relating to water management and water security in the Mendoza region and other areas with analogous conditions. Among the important areas of cooperation is capacity building. With this in mind, the UA AQUASEC team and the DGI have agreed to conduct a training workshop in Mendoza, between August 3 and 6, 2016. The workshop, which emphasizes “soft-path”

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modes of water governance, is titled, “Good Water Governance Practices: Adapting Successful Approaches to Address Water Security in Mendoza, Argentina.” The event will be hosted and partly supported by the DGI, and partly supported by IWSN. The organizers are seeking additional cosponsors to help support the participation of water professionals from across the Americas.

SUB DEPARTMENT OF INFORMATION, MONITORING AND PREVENTION FOR INTEGRATED RISK MANAGEMENT (IMP-GIR) OF THE MINISTRY OF AGRICULTURE OF CHILE

1. Training of multiple stakeholders to strengthen capacities on climate services targeting water resources management and to increase resilience to climate hazards:
To develop an e-learning training course on drought and vulnerability. The course will be developed at the framework of collaborative network of professionals of the countries. It will be implemented at the own learning platforms, without costs for users; course intended for training of professionals of the agricultural sector. It could be possible to integrate this course to other platforms, for example, to the World Bank Group (Open Learning Campus) to be widely available. This activity will be financed with the support of countries and partners, and it will be explored the possibility that the World Bank contributed to its concretion.
2. Dryland Expert Database and Regional Handbook of Drought Management:
A board or working group coordinated by the Sub Department IMP-GIR to construct a Chilean Dryland Experts Database (**participative** process) to integrate the existing Dryland Expert DB, being modeled taking account the Open Learning Campus of the World Bank Group or other similar platform for knowledge. This kind of model consider collaboration networks between people, knowledge access y courses offerings and documents, contact with experts, etc. This will permit to count on articles and documents with the purpose to be added to the Handbook of Drought Management Tools. At this part of the initiative it will be possible to add measures and practices identified for agriculture of dryland areas, and an App mobile developed for this purpose.¹
3. Building climate resilient watersheds while enhancing their ecosystem services:
To print and broadcast adaptation practices. Handbook for dryland areas.
Mobile App for field practices related to adaptation (step by step implementation of each practice, maintenance, recommendations of production and market). This App will be based on a Handbook developed for dryland areas, INIA experiences on regenerative agriculture, holistic management, Keyline system, rainfall harvesting, etc.

WORLD BANK

1. Improvement of the currently available knowledge platforms
The second proposal suggests carrying out a high level annual joint meeting -or an even more tangible global knowledge platform- between different partners on water security. It would serve as a repository of data and knowledge generated by different projects undertaken in coordination with partner institutions from the regions. It is worthwhile that the WB participates shaping such partnership.

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2. Building Communities of Practice

“CLiMwaR-LAC” is promoting a community of practice on drought management tools, which was established as a result of international and regional collaboration during previous regional projects. More than 100 experts on climate services, among other topics, from more than 25 countries in the region to provide the required critical mass to support the pilot projects in force.

This CoP provides sustainability after the projects cease.

On the other hand, as a result of climate variability and change, more WB teams are being requested to support client countries on drought. The WB has identified that there is a cross-sectorial group of people working on drought preparedness inside the institution, so the first steps to build a formal Community of Practice on the issue have been taken. In parallel to its conception, a help desk to answer questions on the issue from across the Bank will be created. Ultimately, the Bank will shape a strategic approach on the topic, based on all the gaps and opportunities identified.

For this reason, feedback between this people at the WB and external communities of experts in particular facets of drought is more than recommendable to tap into high level expertise for the projects. Equally, the “CLiMwaR-LAC” CoP can benefit from the WB one to incorporate more experiences from the field and from other regions.

This clearly connects with the second UN proposal (“Addressing water security: climate impacts and adaptation responses in Africa, Asia and LAC”), whose strategy mentions the emphasis on “fostering alliances, building intellectual exchange, encouraging knowledge sharing and operational partnerships for water security”.

THE INTERNATIONAL CENTER FOR HYDROINFORMATICS (CIH)

1. Host presential courses, given CIH’s strategic geographical location in the region (located in the triple border between Brazil, Paraguay and Argentina);
2. Distance learning structure for virtual courses.

WATER CENTER FOR ARID AND SEMI-ARID ZONES IN LATIN AMERICA AND THE CARIBBEAN (CAZALAC)

According to the G-WADI initiative and based on the objectives proposed by the CLiMwaR-LAC project, a database of isotopes experts will be developed and promoted by CAZALAC. This initiative will kick-start an expert Forum regarding this topic.